

### **REMARKS**

In the outstanding Office Action, the Examiner objected to the specification; rejected claims 14-20 and 24-27 under 35 U.S.C. § 112, first and second paragraphs; rejected claim 14 under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent No. 4,619,680 to Nourshargh et al. ("Nourshargh") in view of U.S. Patent No. 6,356,694 to Weber ("Weber"); rejected claims 15-17, 24-26 and 29 under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent No. 6,605,228 to Kawaguchi et al. ("Kawaguchi") in view of U.S. Patent No. 3,850,604 to Klein ("Klein"), Nourshargh and Weber; rejected claims 18-20 under 35 U.S.C. § 103(a) as being unpatentable over Kawaguchi in view of Klein and Nourshargh, and further in view of U.S. Patent No. 4,915,810 to Kestigian et al. ("Kestigian"); and rejected claim 27 under 35 U.S.C. § 103(a) as being unpatentable over Kawaguchi in view of Klein, Nourshargh, Weber, and U.S. Patent No. 6,615,614 to Makikawa ("Makikawa").

By this amendment, Applicants have amended claims 14, 18, and 29. Claims 14-29 remain pending, with claims 14-20, 24-27 and 29 presented for examination.

#### **I. Objection to the Information Disclosure Statement**

Regarding the objection to the Information Disclosure Statement (IDS), the Examiner asserts that the lists (Form PTO/SB/08 documents) fail to indicate the date, the complete date and/or the pages for each of the references.

#### **IDS Stamped October 11, 2005**

With regard to the IDS stamped October 11, 2005, the Examiner has crossed out the reference Dorey, R. A., "Low Temperature Micromoulding of Functional Ceramic Devices," Grant Summary for GR/S84156/01 for the UK Engineering and Physical Sciences Research

Council, 2 pages (2004). That reference post dates the filing date of the present application and therefore is not prior art.

IDS Stamped August 10, 2005

With regard to the IDS stamped August 10, 2005, although the Examiner has signed the bottoms of pages 1-3 with respect to US Patents and Published U.S. Patent Applications, the Examiner has not specifically indicated that each of those references have been considered. Applicants request that the Examiner indicate in the left column that the individual references have been considered.

With respect to reference JP 7-233469, the Examiner indicates that no copy of that references was received. That reference is relisted on the attached SB-08 form along with a copy of the reference. Applicant asks that the Examiner consider this reference.

With respect to the Non-Patent literature that the Examiner has lined through, those references with dates after the filing of the present invention have been omitted because they are not prior art. The remaining references have been relisted on the attached SB-08 form. Although many of them do not have full dates, the year of publication is listed. Also, copies of the references that the Examiner indicated were not received in the original filing are attached. Applicants request that the Examiner consider these references.

**II. Objection to the specification**

Regarding the objection to the specification, the Examiner asserts that the specification fails to provide antecedent basis for the term "core layer deposit." Although Applicants do not agree with the Examiner, the term "core layer deposit," has been removed from claim 14. Accordingly, Applicants respectfully request that the objection to the specification be withdrawn.

**III. Rejection under 35 U.S.C. § 112, second paragraph**

Regarding the rejection of claims 14-20, 24-27, and 29 under 35 U.S.C. § 112, second paragraph, the Examiner first asserts with respect to claim 14: “[t]here is no mention of [a core layer deposit] in the specification.” Office Action, page 3. Although Applicants do not agree with the Examiner’s assertion, Applicants have amended claim 14, removing the term “core layer deposit.”

With respect to elements recited in claims 14, 18, and 29, the Examiner further asserts that “[i]t is not understood what is meant by a separate step of patterning the core layer,” and “it is noted that there is no art-recognized meaning of the term pattern.” Office Action, page 4. Applicants disagree with the Examiner’s assertions. To expedite prosecution, however, Applicants have amended claims 14, 18, and 29 to change “patterning” to “etching.”

Moreover, with respect to the Examiner’s assertion that “a separate step of etching the core layer” is indefinite, and not understood, Applicants respectfully submit that “[d]uring patent examination, the pending claims must be ‘given their broadest reasonable interpretation consistent with the specification.’” MPEP § 2111, 8th Ed. (Rev. 4), October, 2005 (quoting *In re Hyatt*, 211 F.3d 1367, 1372, 54 USPQ2d 1664, 1667 (Fed. Cir. 2000)). That is, that the process recited in claims 14 and 18, and the method recited in claim 29, does not perform, or require “a separate step of etching the core layer.” In other words, consistent with Applicants’ claimed invention, the core layer is not etched. Support for this element may be found in Applicants’ specification at, for example, paragraph [0008], lines 1-2; paragraph [0014], lines 1-2; and paragraph [0024], lines 3-4.

Accordingly, Applicants respectfully request that the Examiner withdraw the rejections of claims 14-20, 24-27 and 29 under 35 U.S.C. § 112, second paragraph.

**IV. Rejection under 35 U.S.C. § 112, first paragraph**

Regarding the rejection of claims 14-20 and 24-27 under 35 U.S.C. § 112, first paragraph, the Examiner first states, “[the] Examiner could find no support for the limitation that the process excludes a separate step of patterning the core layer.” Applicants initially note that the element in question has been amended by the present amendment to recite “a separate step of etching the core layer” (emphasis added). Moreover, Applicants submit that support for this element may be found in Applicants’ specification at, for example, paragraph [0008], lines 1-2; paragraph [0014], lines 1-2; and paragraph [0024], lines 3-4.

The Examiner contends that “[i]t appears that applicant merely added the negative limitation merely to carve out a patentable portion,” citing to MPEP § 2163.04. Despite the Examiner’s contention, Applicants respectfully note that the very first sentence section of the MPEP cited by the Examiner states: “[w]ith respect to changing numerical range limitations... .” MPEP § 2163.04, 8th Ed. (Rev. 4), October, 2005. Because the element “a separate step of etching the core layer,” as recited in claims 14, 18, and 29 does not recite any numerical range limitations, Applicants respectfully submit that the Examiner’s arguments with respect to negative limitations and MPEP § 2163.04 are moot.

Accordingly, Applicants respectfully request that the rejection of claims 14-20 and 24-27 under 35 U.S.C. § 112, first paragraph, be withdrawn.

Applicants additionally note that concluding the section in the Office Action concerning rejections under 35 U.S.C. § 112, first paragraph, the Examiner includes a statement of official notice. Although seemingly not related to the § 112 issues, Applicants note that the Examiner has taken Official Notice, and remind the Examiner of the proper requirements for taking Official Notice. When relying on common knowledge, or taking Official Notice, to support a rejection under 35 U.S.C. § 103(a), “the Board [or examiner] must point to some concrete

evidence in the record in support of these findings" to satisfy the substantial evidence test. *In re Zurko*, 258 F.3d 1379, 1386, 59 USPQ2d 1693, 1697. Furthermore, if the examiner is relying on personal knowledge to support the finding of what is known in the art, the examiner must provide an affidavit or declaration setting forth specific factual statements and explanation to support the finding. *See* 37 CFR 1.104(d)(2). If the Examiner maintains the rejection by relying on the position that "mixed frequency power supplies for sputtering were (at the time of the invention) well known," Applicants ask that the Examiner provide additional evidentiary evidence, either in the form of a reference or affidavit, to support this statement.

**V. Rejections under 35 U.S.C. § 103(a)**

Regarding the rejection of claims 14-20, 24-27 and 29 under 35 U.S.C. § 103(a), Applicants respectfully disagree with the Examiner's arguments and conclusions as set forth in the outstanding Office Action. Accordingly, Applicants respectfully traverse this rejection.

To establish a *prima facie* case of obviousness under 35 U.S.C. §103(a), each of three requirements must be met. First, the reference or references, taken alone or combined, must teach or suggest each and every element recited in the claims. *See* MPEP §2143.03 8th Ed. (Rev. 4), October, 2005. Second, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to combine the references in a manner resulting in the claimed invention. Third, a reasonable expectation of success must exist. Moreover, each of the three requirements must "be found in the prior art, and not be based on applicant's disclosure." *See* MPEP § 2143 8th Ed. (Rev. 4), October, 2005. A *prima facie* case of obviousness has not been established because, at a minimum, the references fail to teach or suggest every element recited in the claims.

A. Nourshargh in view of Weber

Nourshargh fails to teach or suggest a combination including at least “the core layer covers the ridge portion, the sidewall portion, and the planar portion of the ridge structure,” as recited in amended claim 14. Nourshargh teaches:

the desired waveguide pattern is first written on a substrate 11 using photolithography ... core glass 14 is deposited on the substrate ... and by suitably controlling the amount of dopant in the core glass as the dopant in the core glass as the deposition process is carried out, it may have any desired refractive-index profile across its thickness *which is less than the depth of the grooves* 13 so that the waveguide is fully embedded within the grooves 13. Nourshargh, col. 2, lines 7-28 (emphasis added).

As further shown in Fig. 2(c), since the thickness of the core glass 14 is less than the depth of the grooves 13, core glass 14 does not “covers the ridge portion, *the sidewall portion*, and the planar portion of the ridge structure,” as recited in claim 14 (emphasis added).

Nourshargh also fails to teach or suggest a combination including at least “wherein the process excludes a separate step of etching the core layer,” as recited in amended claim 14.

Nourshargh teaches

[t]he required waveguide pattern is then written photolithographically on the deposited core layer and this pattern is suitably masked 12 (FIG. 3(b)). The rest of the core layer is completely *etched away*. Nourshargh, col. 2, lines 37-41 (emphasis added).

Nourshargh thus fails to teach suggest a combination including “wherein the process excludes a separate step of etching the core layer,” as recited in claim 14.

Weber, cited by the Examiner for allegedly teaching “plac[ing] a fluoride layer around all the surfaces,” fails to cure the above-noted deficiencies of Nourshargh. Weber teaches manufacturing a planar waveguide, wherein “surface of layer 2 is etched,” and etching produces a thin layer with high fluoride content.” Weber, col. 2, lines 45-49. Weber further teaches

“silicon oxide core layer 3 is deposited,” and “this layer 3 remains complete or is structured,” wherein “[s]tructuring of the waveguide can be accomplished ... by reactive ion *etching*.”

Weber, col. 2, lines 55-58 (emphasis added).

Weber specifically teaches depositing core layer 3 on thin planar fluoride layer 4, and is silent as to a ridge structure. Weber thus fails to teach or suggest “the core layer covers the ridge portion, the sidewall portion, and the planar portion of the ridge structure,” as recited in amended claim 14. Weber further explicitly teaches etching core layer 3, and thus also fails to teach or suggest a process “wherein the process excludes a separate step of etching the core layer,” as also recited in amended claim 14.

Because Nourshargh and Weber fail to teach or suggest every element recited in claim 14, a *prima facie* case of obviousness has not been established. Accordingly, Applicants respectfully request that the Examiner withdraw the rejection of claim 14 under 35 U.S.C. § 103(a).

B. Kawaguchi in view of Klein, Nourshargh, and Weber

Claims 15-17 and 24-26 depend from claim 14, and thus require all of the elements of claim 14. The combination of Kawaguchi, Klein, Nourshargh, and Weber fails to teach or suggest every element of claim 14, and therefore fails to teach every element required by dependent claims 15-17 and 24-26. Claims 14 and 29, as amended, recite a combination including “the core layer covers the ridge portion, the sidewall portion, and the planar portion of the ridge structure,” and “wherein the process excludes a separate step of etching the core layer.” As discussed above, Nourshargh and Weber fail to teach these elements. Kawaguchi also fails to teach at least these elements.

Kawaguchi teaches a process for fabricating planar optical waveguide devices. Kawaguchi, col. 1, lines 38-45. The process requires placing a photoresist in a prescribed

waveguide pattern over a surface of a substrate. *Id.* at col. 5, lines 64-66. Recesses 12a (Figures 7a-7e) are formed in the substrate using an etching process. *Id.* at col. 5, line 66- col. 6, line 2. A core layer 14' is subsequently formed on the substrate and in the recesses. *Id.* at col. 6, lines 3-10. The core layer is then patterned, using either polishing or *etching*, such that the core layer 14' *remains only in the recess* 12a, "and the core 14 and the substrate 12 jointly define a planar surface." *Id.* at col. 6, lines 16-20. The process described in Kawaguchi involves a plurality of separate steps, including forming the core layer, doping the core layer, HIPping the assembly, and then patterning the core layer. *Id.* at col. 6, lines 6-20.

Kawaguchi thus clearly teaches that the core layer 14' remains only in the recess, and does not cover "the ridge portion, the sidewall portion, and the planar portion,," and that the core layer 14' is etched. Accordingly, Kawaguchi fails to teach at least the elements, "the core layer covers the ridge portion, the sidewall portion, and the planar portion of the ridge structure," and "wherein the process excludes a separate step of etching the core layer," as recited in amended claims 14 and 29, and required by dependent claims 15-17 and 24-26.

Klein, cited for teaching "what one of ordinary skill in the art thinks of when one is to sputter glass," fails to cure the deficiencies of Kawaguchi. Klein teaches a general method for sputtering a target using, for example, an RF discharge. Klein, col. 4, lines 3-15. Klein, however, fails to teach or suggest at least the elements, "the core layer covers the ridge portion, the sidewall portion, and the planar portion of the ridge structure," and "wherein the process excludes a separate step of etching the core layer," as recited in amended claims 14 and 29, and required by dependent claims 15-17 and 24-26.

Nourshargh is apparently cited by the Examiner for teaching:

"removal of the rest of the first layer is not required", and that "the second layer of glass can be immediately deposited". Office Action, page 6.



Nourshargh, as noted above, also fails to teach at least “the core layer covers the ridge portion, the sidewall portion, and the planar portion of the ridge structure,” and “wherein the process excludes a separate step of etching the core layer,” as recited in amended claims 14 and 29, and required by dependent claims 15-17 and 24-26, and thus fails to cure the above-noted deficiencies of Kawaguchi and Klein.

Accordingly, Kawaguchi in view of Klein, Nourshargh, and Weber fails to teach or suggest every element recited in claims 14 and 29, and required by claims 15-17 and 24-26.

Furthermore, there is no motivation for combining the references in the manner that the Examiner is suggesting. The Examiner states as an alleged motivation for combining the references:

[i]t would have been obvious to form the Kawaguchi waveguide by using the Nourshargh mode of figure 2, so that one can immediately form the second layer over the first layer. Office Action, page 6.

Kawaguchi, however, specifically teaches:

a photoresist layer in a prescribed waveguide pattern is placed on a the surface of a substrate ... [a] core layer 14' is formed on the surface of the substrate ... [t]hen the surface of the assembly is removed until the surface of the substrate 12 is exposed either by physical polishing or chemical etching (Fig. 7d). This results in a core 14 formed in the recess 12a of the substrate 12, and the core 14 and the substrate jointly define a planar surface. Kawaguchi, col. 5, line 64 - col. 6, line 20.

Accordingly, the method of Kawaguchi specifically teaches a process *including* a separate step of patterning the core layer. Moreover, as further taught by Kawaguchi, this separate step of patterning the core layer is to define a planar surface on which to deposit the upper clad layer to “reduce or eliminate the voids 18” in the upper cladding layer: *Id.*, at col. 6, lines 13-14.

[w]hen a recess is formed in the lower clad layer to form the core in the recess, the upper clad layer may be placed on a planar surface, and creation of voids in the upper cladding layer can be avoided. *Id.*, at col. 1, lines 59-62.

Therefore, since Kawaguchi specifically utilizes a separate step of patterning the core layer to eliminate or reduce voids, one of ordinary skill in the art, when looking to modify Kawaguchi, would not have been motivated to “form the Kawaguchi waveguide by using the Nourshargh mode of figure 2,” as the Examiner is suggesting. It is thus apparent that the Examiner’s approach to the ultimate legal conclusion of obviousness amounts to a retrospective assessment as to how the claimed invention works and then combining references with divergent teachings to arrive at the claimed invention, a reverse engineering approach that has been repeatedly judicially condemned. *See Uniroyal, Inc. v. Rudkin-Wiley Corp.*, 837 F.2d 1044, 5 USPQ2d 1434 (Fed. Cir. 1988). Absent such hindsight reasoning, one of ordinary skill in the art would not have been motivated to combine the references in the manner suggested by the Examiner.

For at least the above reasons, Applicants respectfully submit that the Examiner has failed to establish a *prima facie* case of obviousness. Accordingly, Applicants respectfully request that the Examiner withdraw the rejection of claims 15-17, 24-26, and 29 under 35 U.S.C. § 103(a).

C. Kawaguchi in view of Klein, Nourshargh, and Kestigian

Claim 18, as amended recites a combination including at least the elements, “the core layer covers the ridge portion, the sidewall portion, and the planar portion of the ridge structure,” and “wherein the process excludes a separate step of etching the core layer.” Kawaguchi, whether taken alone, or in combination, fails to teach at least this element.

As discussed above, Kawaguchi utilizes a separate patterning or etching step to form an integral planar surface between the core layer and the recesses to prevent voids from forming upon deposition of the upper cladding layer, wherein the core layer only remains in the recesses. Kawaguchi, e.g., col. 6, lines 16-20. Klein merely teaches a typical glass sputtering method, as discussed above, and fails to cure the deficiencies of Kawaguchi. Nourshargh, as discussed in detail above, cannot be combined in the manner that the Examiner is suggesting, and accordingly cannot be relied upon by the Examiner to cure the deficiencies of Kawaguchi.

Kestigian further fails to cure the deficiencies of Kawaguchi. Kestigian teaches a method for forming targets for use in ion beam sputtering. Kestigian, abstract. Kestigian's method involves the formation of targets wherein plugs with different compositions can be inserted into a plurality of holes formed in the target. *Id.* at col. 3, lines 12-25. Kestigian, however, does not teach or suggest the formation of waveguides or core layers. Thus, Kestigian fails to teach or suggest at least the elements, "the core layer covers the ridge portion, the sidewall portion, and the planar portion of the ridge structure," and "wherein the process excludes a separate step of etching the core layer," as recited in amended claim 18.

Since the references fail to teach or suggest each and every element of claim 18, a *prima facie* case of obviousness has not been established. Accordingly, Applicants respectfully request the rejection of claim 18 under 35 U.S.C. § 103(a) be withdrawn.

Claims 19-20 depend from claim 18, and thus require all of the elements of claim 18. Since Kawaguchi, whether taken alone or in combination with Klein, Nourshargh, and Kestigian, fails to teach each and every element of claim 18, the references further fail to teach each and every element of the dependent claims. Thus, a *prima facie* case of obviousness has not been made. Accordingly, Applicants respectfully request that the Examiner withdraw the rejection of claims 19-20 under 35 U.S.C. § 103(a).

D. Kawaguchi in view of Klein, Nourshargh, and Makikawa

Claim 27 depends from claim 14, and thus requires all of the elements of claim 14. As discussed above, neither Kawaguchi, nor Klein, nor Nourshargh teach or suggest at least the elements “the core layer covers the ridge portion, the sidewall portion, and the planar portion of the ridge structure,” and “wherein the process excludes a separate step of etching the core layer,” as recited in amended claim 14 and required by claim 27. Makikawa fails to cure the above-noted deficiencies of these references.

Makikawa, apparently cited by the Examiner at page 13 of the Office Action for teaching “etch[ing] silicon and then thermally oxidize the silicon and this results in non-deformed substrate,” discloses a method for preparing an optical waveguide substrate. As shown in FIG 1 (c)-(d), Makikawa teaches depositing a core layer 14 in grooves 12, and over oxidized substrate

13. Makikawa further teaches, however, that:

the surface of the resulting structure is abraded off until the substrate is exposed and a flat surface is defined ... [a]brasion is preferably continued until the buried portions of the core film are abrade several microns. This results in the substrate in which the core film segments 14 and the under clad film 13 are present on the same substrate surface. Makikawa, col. 3, lines 34-46.

Accordingly, this cannot constitute a teaching of “the core layer covers the ridge portion, the sidewall portion, and the planar portion of the ridge structure,” and “wherein the process excludes a separate step of etching the core layer,” as recited in claim 14 and required by claim 27. Since the references, whether taken alone or in combination, fail to teach or suggest each and every element required by claim 27, the Examiner has failed to establish a *prima facie* case of obviousness. Accordingly, Applicants respectfully request that the Examiner withdraw the rejection of claim 27 under 35 U.S.C. § 103(a).

In view of the foregoing amendments and remarks, Applicant respectfully requests reconsideration and reexamination of this application and the timely allowance of the pending claims.

Please grant any extensions of time required to enter this response and charge any additional required fees to our deposit account 06-0916.

Respectfully submitted,

FINNEGAN, HENDERSON, FARABOW,  
GARRETT & DUNNER, L.L.P.

Dated: February 28, 2006

By: 

Gary J. Edwards  
Reg. No. 41,008

Attachments: Form PTO/SB/08  
Two (2) Cited Documents

<b>EXPRESS MAIL LABEL NO.</b> <b>EV 746094856 US</b>
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